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Date: 5-23-92

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Dr. Richard Spinrad
Office of Naval Research
800 North Quincy Street
Arlington VA 22217-5000

ONR Grant # N00014-90-J-1215

OSU Acct. # 30-262-3099

Dear Dr. Spinrad:

In order to complete my ONR grant entitled "CTZ Jet Structure," I am sending three copies of the *Final Technical Report* to you with copies distributed as indicated below.

Sincerely,

Douglas R. Caldwell

James N. Moum

cc: Defense Technical Information Center (2 copies)
Bldg 5, Cameron Station
Alexandria, VA 22304-6145

Administrative Contracting Officer (1 copy)
Office of Naval Research
Resident Representative N63374
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Director, Naval Research Laboratory (1 copy)
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Washington DC 20375

Grant N00014-90-J-1215
"Coastal Transition Zone Jet Structure"
PIs: Douglas R. Caldwell, James N. Moum, Clayton A Paulson

Final Technical Report

The task under this grant was the analysis of oceanic microstructure and other data obtained in two cruises carried out as part of the Coastal Transition Zone experiment. As a result of this analysis, three scientific papers have been published and one more has been submitted for publication.

Summaries of the major results contained in the publications follow:

1. "Sea slicks and surface strain" by J. N. Moum, D. J. Carlson and T. J. Cowles, Deep-Sea Res., *37*, 767-775, 1990: For the first time, detailed underway measurement of sea-surface chemistry were made in conjunction with microscale physical measurements. Intense sea-surface slicks were discovered to be associated with convergence-favorable surface strain, low wind speeds and low mixing rates, within a meandering filament of cool water. No intense slicks were found in regions of divergence-favorable surface strain, or at higher wind speeds, or outside the cool filament. Slicks were observed only in regions of high subsurface chlorophyll fluorescence.

2. "Enhancement of fronts by vertical mixing" by R. K. Dewey and J. N. Moum, J. Geophys. Res., *95*, 9433-9446, 1990: An example from the CTZ experiment showed how wind-generated vertical mixing in the surface layer of the ocean can cause fronts to sharpen.

3. "Structure and Dynamics of a coastal filament" by R. K. Dewey, J. N. Moum, C. A. Paulson, D. R. Caldwell and S. D. Pierce. J. Geophys. Res. *96*, 14,885-14,907. In this report on repeated transects across the filament using a microstructure instrument, a towed thermistor chain and an ADCP, it was shown that a) the flow was very nearly geostrophic, but on the occasion that the filament flowed southward, nongeostrophic influences were detected, b) vertical velocities are consistent with model predictions, and c) local recirculation within the filament is significant.

Another manuscript submitted for publication and presently under review is:

- "Microstructure Activity within a Mini-Filament in the Coastal Transition Zone" by R. K. Dewey, J. N. Moum and D. R. Caldwell, submitted to the Journal of Physical Oceanography: The properties and possible origin of a small filament identified within the CTZ are studied using microstructure measurements, along with satellite observations and other shipboard measurements. It is concluded that the filament was created by a combination of diapycnal mixing driven by strong shears, and localized upwelling driven by adjustments in the velocity field.